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ABSTRACT

This newsletter contains nine articles covering the topic of technology and adult learning and exploring what has been achieved in the six years since the Office of Technology Assessment conducted a study on adult literacy and new technologies. Included are (1): "Technology and Adult Learning: A Collection of Current Perspectives" (Office of Technology Assessment); (2) "Some Simple Advice for Tutors on Using Computers with Literacy Students" (Paul Miller); (3) "Using Technology in Family Literacy Programs" (Kathy Kuy); (4) "What We've Learned in the GTE Family Literacy and Technology Project" (Nancy Frazier); (5) "How Do Computers Enhance Student Achievement?"; (6) "Computer Technology and the Changing Perception of Literacy" (Ulises Mejias Butron, Hong Li, Steven McIntosh); (7) "How Can Technology Remove Barriers to Learning?"; (8) "Using Technologies Effectively in Adult and Vocational Education" (Susan Imel); and (9) "From the Editor's Desk" (Chip Carlin). (KC)

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A Collection of Current Perspectives

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Literacy Practitioner

Technology Issue

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Technology and Adult Learning

A Collection of Current Perspectives

In 1993 the Office of Technology Assessment (OTA, U.S. Congress) conducted the study, Adult Literacy and New Technologies-Tools for a Lifetime. The researchers concluded, "Today's technology offers enormous potential for substantially changing the field of adult literacy," yet, "...technology is not a central consideration for most literacy programs."

To explore what has been achieved in the past six years, notable authorities in the field of adult learning and technology were asked to share their perspectives on the current state of technology in adult education and their visions for the future. The following is a collection of their comments received via an e-mail survey in June 1999.

Susan Gaer teaches ESL and trains teachers in technology infusion at Santa Ana College, School of Continuing Education and serves on the CATESOL state board as Technology Consultant in Santa Ana, California.

David Rosen is the Director of the Adult Literacy Resource Institute in Boston, Massachusetts and moderator of the National Literacy Advocacy (NLA) electronic list.

Susan Imel is Director of the ERIC Clearinghouse on Adult, Career, and Vocational Education at the Ohio State University, Columbus, Ohio.

Emily Hacker is Coordinator of Instructional Technology at the Literacy Assistance Center in New York, New York.

What's changed in the last six years? Do you see technology as a central concern in adult literacy and how is it impacting the field now?

"I see it as a central concern. In adult literacy we need to be concerned with helping our adult literacy students function in today's society. How is it impacting the field? Slowly, I think. It is very hard for the field to keep up with technology; however, what is important is not what you have, but what you do with it." *(S. Gaer)*

"Computers and the Internet, but also to some extent broadcast television, are a center stage concern for most adult literacy programs now. There has also been some increase in programs' access to technology, although this is uneven." *(D. Rosen)*

"During the past six years, several major efforts related to technology have been funded and this work is making a difference. However, I do not think that many states have developed technology plans and little sharing has occurred. I'm not sure that technology is a central concern in adult literacy although it is in some programs and in some areas. For example, in Ohio I have been assisting with the development of an evaluation system. During the past year, all programs were expected to begin reporting data electronically using a database program that is really fairly simple. Many programs have been unsuccessful in uploading data monthly (despite lots of support and on-site technical assistance). The move toward greater accountability seems to demand better use of technology. Based on this experience, it is unclear to what extent all programs have the capability. It's quite clear that there is not a level playing field when it comes to technology." *(S. Imel)*

"I certainly see technology as a central concern in the adult literacy field now. It has become so deeply imbedded in all aspects of our culture, especially the workplace, that is must now be considered a part of the equation that equals literacy. However, the focus for literacy programs should be on good instructional practice and content and not on technology, or any other delivery medium in an isolated sense. Literacy students will achieve the most by learning with technology, not learning about technology." *(E. Hacker)*

The OTA (1993) study found that there "is a wide gap between practice and promise" and that one of the barriers to implementation is "stable funding." Is the increased need for funding still the major barrier to fully realizing the "promise of technology"?

"I wonder what the 'promise of technology' is. I don't think there is a promise. Using technology is just something like reading, that people need to become 'literate' in. The major barrier that I see is the teacher and/or administrator who makes technology scary to access." *(S. Gaer)*

"While it's my impression that programs do not have significantly more money now than in the past, based on what I have heard at a couple of recent conferences, I think that one barrier is lack of creativity on the part of teachers and

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administrators. I have heard presentations by teachers who have overcome major barriers to provide access for their students. One used the local library, for example. I think that staff development is needed to help teachers understand the potential of technology and how it can be truly integrated into teaching. Based on my reading and conference presentations I have heard, I think that teachers who have a 'propensity' to use technology anyway are going to make the most creative and innovative uses of it in teaching and learning. We need more sharing about how technology can be incorporated into teaching, including how it doesn't take a 'techno-wiz' to use it effectively." *(S. Imel)*

"I think that the statement that there is a gap between practice and promise is still true. There is also a chasm practitioners have to jump to get to 'practice'– not to mention reaching 'promise.' Most adult literacy practitioners still do not have regular, everyday access to computers for their own professional use, or for their students' use. Lack of stable funding is the main reason, but many administrators do not appreciate that many practitioners need paid staff development time for training, and practice in using the new technologies.

The state adult education director in Massachusetts, Bob Bickerton, has rightly said that for every dollar we spend on hardware and software we should spend a dollar on staff development so that practitioners can use these technologies effectively with their students. The need for funding is still the major barrier, but staff development is a close second. A third barrier is time for integrating these tools so that they become a normal, expected part of daily adult education practice. This, of course, takes funding, but also vision, commitment, and teacher and administrator know-how." *(D. Rosen)*

"For every dollar we spend on hardware and software we should spend a dollar on staff development..."

"For some programs, funding is still a major obstacle to fully integrating technology into literacy services. However, a second major obstacle is that teachers do not receive enough training in how to effectively use the hardware and software that their programs have. Too often computers in literacy programs are only used by the few teachers who are self-taught. Additionally, programs frequently purchase hardware and software in bits and pieces as money is available, without a comprehensive technology plan to guide them in deciding how to most effectively use the money. Many times the obvious choice (e.g., buying a new computer) may not be the best choice (e.g., sending five teachers to high quality computer training).

Time and assumptions about technology can also be barriers. Literacy teachers are expected to be so many things today. Besides ESOL or Basic Education specialists they are often expected to be job preparation coaches, job developers, social workers, and now technology experts. I understand why some teachers may feel resistant to yet another new thing added to their plate. This is why it's important to demystify technology for these teachers. They need to understand that one does not need to be a 'techie' or have a degree in computer programming to successfully use technology in the classroom. For learners, too, assumptions can impede their motivation to learn about technology. Computers may be seen by some learners as culturally 'elite' or highly technical, rather than as everyday tools that can be used to solve common, nontechnical problems, get needed information, communicate with family and friends, help children with homework, pursue various interests and, for some, to have fun." *(E. Hacker)*

Equity/access has always been an issue for adult learners and for literacy programs with inadequate budgets and resources. How can personal access to learning resources be extended to all adults, especially those who are not being reached by the current system?

"Partnerships seem to be one of the best ways to extend access. Many K-12 schools have computer labs that may be available to local literacy programs during after-school hours. Older students in these schools may be able to get community service credits for providing computer tutoring to adult learners. A group of community based organizations can join together to apply for funding to develop a community technology center." *(E. Hacker)*

"Access for adult learners continues to be a big problem, although an increasing number of students are buying computers to use at home. We can help adult students understand how to buy and use computers at home, including refurbished, low-cost computers. We can provide them with training which leads to computer comfort and competence and ongoing opportunities to upgrade their computer knowledge. We can also encourage them to become part of a community of people who teach each other about computers, the way many American teenagers used to teach each other about basic car maintenance and repair in a nonformal way." *(D. Rosen)*

One of the most often encountered questions in adult literacy is: What educational software is out there for low-level literacy students? In the six years since the OTA study, it doesn't appear that adult literacy software is a high priority for vendors. How have you, or the groups you work with, found creative ways to address the educational software issue?

"Encourage students to engage in project-based learning where they use computers as tools for word processing, publishing, or communicating with other students and programs. Have them design their own learning materials, such as basic level inquiry maps. Also there are some good Web sites, OTAN and others, for intermediate or high beginner level students, based on news articles." *(D. Rosen)*

"I believe in constructionism, which is where students create their own learning based on what they need to know. So any software I use has to lend itself to creativity. I like Hollywood High by Theatrix, any word processing program, and the WWW." *(S. Gaer)*

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Some Simple Advice for Tutors on Using Computers with Literacy Students

Paul Miller
Literacy Volunteers of Broome/Tioga Counties
Binghamton, NY

Many have written about how and why to add computer-based instruction to adult literacy programs. This literature is largely intended for program administrators. Little practical information exists for tutors. In this article I make six recommendations for tutors who are planning to use computers with their students. I also draw from the experience of tutors who have supplemented their weekly lessons with time on the computer.

Teach your student basic skills such as using a mouse or keyboard.

The evidence seems to suggest that technology can enhance one-on-one tutoring, and that tutors can help learners develop valuable computer skills. Avoid always taking the lead with your students. Let them get in and out of the software by themselves. Students want to become competent with computers and might realize, better than you, why this is important. White and blue-collar jobs today require some background with computers. Mastering computer skills will also be a big boost to your student's self-esteem.

Use word processing programs effectively.

Word processing programs have obvious applications for literacy students. Language experience stories, student writings, and sight word exercises can be created with such programs. Documents are easy to edit, and your student will appreciate a professional looking, book-like copy. Consider also writing a "letter" to your student. Save a message on a disk, have your student open it when you are not meeting together, and ask the student to respond to a question. This allows your student to practice reading and writing at a time when you are not available. One genuine asset of using a computer is that it can increase the amount of time that a student reads and writes each week.

"One genuine asset of using a computer is that it can increase the amount of time that a student reads and writes each week."

Consider using a commercially produced reading program.

Lots of educational programs exist to improve your student's phonics, sight-word, and comprehension abilities. Most programs come with stories but a few are designed to guide your student through real-life exercises such as reading a menu or filling out a job application. None of this software is perfect. The stories can seem meaningless or juvenile. Even at its best, the software can not duplicate available print sources. Still, tutors in our affiliate use this software frequently at one of our adult learning labs. One tutor explained to me that her student liked the software because it is accessible — the big print is easier to read and it is written at a level he can understand.

Tutors also seem to like the exercises that come with some of this software. Some programs contain stories as well as language exercises that teach students to read in phrases, create cloze assignments, improve spelling, and build sight word vocabularies. One tutor agreed with me that the stories were silly, but she found that her student liked the sound and pictures and was motivated to read more. The high-quality pictures and elaborate graphics also help students read and comprehend. One tutor explained that the pictures help her student "see" the text he is reading. "This really helps his word recognition and comprehension," she explained. Other tutors say that while they love books, a computer program is visually more stimulating and offers more than one use of the text. This has translated into more time spent reading, at and away from the computer, and more progress than was achieved with print materials alone.

The only software I feel comfortable recommending is The Rosetta Stone, an outstanding program for ESOL learners from Fairfield Language Technologies. This program teaches words, phrases, and sentences using high quality pictures and sound and allows students to test their pronunciation. Some lessons can even be used with basic students. Nashville Reads publishes a program called Smart Radio that is clever and fun but may be too difficult for lower-level readers. Children's storybook or writing software will enhance family literacy activities by getting parents and children to read and write together. All software should be carefully previewed before it is purchased.

Encourage students to use the software on their own.

One meeting a week for an hour or two is not enough time to significantly improve a student's reading and writing ability. Students must continue to read and write in between lessons. Low-level readers, especially, need frequent practice. In this case a computer with learning software allows students to work on their own. This does not mean that computers are substitutes for tutors, but computers can provide valuable supplements.

Supplement and vary your lessons with computers.

For years, many people believed that computers would replace tutors. It is clear, though, that guidance and feedback from a caring teacher is critical to success. Nevertheless, computers can be used effectively to vary lesson plans. The key word here is "vary." None of the tutors in our affiliate build their

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lessons around the computer or even a "canned" reading program. They take very seriously the idea that learning should focus on student-centered resources which usually have nothing to do with computers. But along with using materials from work, standardized tests, and devotional literature – common material selected by students – computer programs can be used to reinforce phonics and sight word ability and help students improve their comprehension. Tutors who use computers believe that their students are more motivated and show greater progress. Using a computer might also add some fun to lessons. Do not underestimate the importance of this. Making lessons informative, learner-centered, and fun increases the chances of retaining new students.

In the last two years the Internet has increased public interest in computers and technology. Adult educators need to be aware of on-line resources and opportunities to share information with colleagues. The Internet also poses some interesting possibilities for students. Listservs, chat rooms, and Web sites exist for students. Many students have used e-mail to communicate with each other. Still, I am not convinced that these resources are worth the cost of on-line services. One does not have to be on-line to use computers effectively with students.

Computers will never replace capable tutors. Software engineers will never be able to create a program that can truly be called "student-centered." Only tutors can do that. Only tutors understand how their students learn. Only tutors can individualize lessons to maximize learners' potential. Tutors will always be part of the solution. Computers can be part of the solution, too. Technology is a valuable tool, and we can expect that software in the future will be even better. ■

Paul Miller is on the staff of Literacy Volunteers of Broome/Tioga Counties. He is a tutor, a tutor trainer, and the coordinator of the Tioga Adult Learning Lab in Owego, New York.

"Technology and Adult Learning"

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"Many of the groups we work with have been developing their own low-literacy technology projects using 'real world' productivity tools like word processing, spreadsheet and graphics programs, and authoring software like Hyperstudio and other multimedia applications. They have found open-ended applications like these are far more flexible and appropriate for instructional use than most 'canned' educational software. This is especially true for programs that use a project-based and learner centered instructional approach." *(E. Hacker)*

Has the WWW replaced much of what educational software has to offer?

"I am not sure that 'educational software' really ever had much to offer. There are a few titles that interest me, but I believe in equipping our adults for the real world and that means authentic materials. The World Wide Web is a living archive of authentic material." *(S. Gaer)*

"My answer is, no, educational software hasn't offered much, nor has the Web yet. We haven't seen 'killer applications' in adult literacy, and we won't until we provide talented teacher/curriculum developers in our field with solid training in Web page design, and then provide funding for these talented teachers/writers who will have skills in designing curriculum on the Web. Then we'll see literacy and technology take off. At this point what is available, on a scale from 1-10 - where 1 is best, is mostly in the 6-9 range. We need to be producing adult learning products and on-line learning environments in the 1-3 range." *(D. Rosen)*

"Again, based on my reading and what I've heard at conferences, I would say yes. Used appropriately, the Web lends itself to constructivist teaching and learning. I've seen and heard how the Web is being used very effectively in project-based learning. It's a great resource." *(S. Imel)*

"There are some great resources on-line that can be used in a variety of ways by innovative teachers. However, a lot of it still functions one-way by providing interesting information and images that an instructor can use to add multiple dimensions to mostly off-line activities. When more and improved interactive features, as well as complete software programs, are available on-line, then what the Web could offer may make the need to purchase software 'in the box' obsolete." *(E. Hacker)*

The National Institute for Literacy and the adult learners who helped define the vision for the Equipped for the Future Initiative identified the fourth fundamental purpose of literacy as "a bridge to the future." Along with "using technology to learn," is it important that adult literacy programs help students "learn to use technology?" Does the definition of literacy include computer literacy?

"Technology is important for survival in today's society. Students must learn how to adapt to and use technology."

"A resounding yes. Not helping students learn to use technology denies them access to a critical, basic skill. Technological proficiency is almost a requirement of modern life. Many of the students in adult literacy have been left behind in so many areas that this is one that they should not be denied." *(S. Imel)*

"Yes! Technology is important for survival in today's society. Students must learn how to adapt to and use technology. I think students need to learn 'survival technology' skills to function in today's society." *(S. Gaer)*

"It is absolutely right that learners need computer skills to compete in a global economy. Also the Internet and desktop publishing software for students who publish support the EFF identified purpose of student voice, but I don't think that 'computer literacy' is a valid concept. I prefer computer comfort and competence. Much of what we are teaching people now, in the name of computer literacy, needs to be taught because computers are such badly designed machines." *(D. Rosen)*

"Yes, if a fundamental meaning of literacy is the ability to comprehend and communicate written and numeric language, then learners should be able to do that using all major mediums of language communication – this now certainly includes computers. Additionally, in an 'age of information,' information and media literacy have become critical components of literacy curricula. Learning how to access and produce information using different mediums, including computers, is the first step in learning to become active and critical readers of information." *(E. Hacker)*

Where do you think "technology and literacy" will be in 2005, six years from now? What is your vision of the future and how can literacy providers move in that direction and take full advantage of the technological tools that are now, and will be available in the future?

"In the adult education world six years is not such a long time to see dramatic changes in instruction or instructional delivery systems. However, I do think learners will more often come to literacy programs with the expectation of learning with technology and their needs will help lead the programs towards better technology integration. There will be more literacy instruction available via the World Wide Web. Since computers are literally being given away now, more adult learners will have computers in their homes and will be able to access on-line instruction. Greater access to distance learning for adults will add pressure to literacy programs to provide technology enhanced instruction." *(E. Hacker)*

"In a speech to the Philadelphia Mayor's Commission on Literacy's Annual Technology and Literacy Conference in May 1999, I listed the following nine things to expect from technology in the next decade:

- Computers in every home, library, and workplace, with high speed Internet access.
- Cheap, portable, Internet accessible computers like pocket calculators or cell phones.
- Desktop and portable, write-able Digital Versatile Disc (DVD) players.
- Telephone or videophone integrated with computers.
- Digital TV with Internet access.
- Computers used to shop, get information, communicate with family and friends, pay bills, and take courses. Integrated with TV, so also an entertainment center for digital concerts, recordings, and movies on demand.
- Huge number of complete documents in on-line libraries, accessible from any computer.
- Databases that use simplified search processes.
- All media content digitized and easily transportable among the various developing media and devices.

Adult education providers can help meet the challenges of the future by exploring distance (distributed, or anytime/anywhere) instruction for students and using assistive technology, or better yet, universally designed hardware and software. Anytime/anywhere opportunities for staff development could include electronic lists, Web-based courses, or Web-based collegial threaded discussions and curriculum projects." *(D. Rosen)*

"Technology is a tool, no more, no less. It is not how much technology you have or how expensive it is; it is how it is used. Technology that is used to help engage learners in the learning process is what is needed." *(S. Gaer)*

"I hope that technology will have solved some of the enduring problems in adult literacy such as lack of participation, lack of access, high dropout rates, and so forth. Five years ago, it would have been impossible to imagine the impact of the Internet and the Web. If things continue to change at the same or faster rate, we should see technology being used as a tool to provide instruction to previously unserved or underserved groups and also as a means of attracting and retaining students who have previously found programs irrelevant." *(S. Imel)*

Open Comments

"Technology is only one of many tools available to adult literacy providers. Like any other tool, it can be used in ways that enhance and/or detract from the teaching/learning setting." *(S. Imel)*

"I don't think technology is the answer to any instructional dream. Access to technology will allow learners to be a strong part of the 21st Century. However, if we don't change our instructional paradigm there will be no way that we as practitioners will be able to help our learners. We need to start thinking in terms of distributed learning systems that are age and grade independent. What should matter is not how old you are but what you need to learn." *(S. Gaer)* ■

Susan Gaer and David Rosen have announced a new Virtual Visit Project where adult education teachers and their students "virtually" visit a classroom in another part of the country using the Internet, e-mail, message boards, and live chat rooms. To learn more about the project go to <http://www.otan.dni.us/webfarm/emailproject/school.htm>.

The Literacy Assistance Center (LAC) <http://www.lacnyc.org> is a not-for-profit organization that provides essential referral, training, information, and technical assistance services to adult and youth literacy programs in New York.

The ERIC Clearinghouse on Adult, Career, and Vocational Education (ERIC/ACVE) <http://www.ericacve.org> provides comprehensive information services in adult and continuing education, career education, and vocational and technical education including employment and training.

Using Technology in Family Literacy Programs

Kathy Kuy
Program Development Director
Literacy Volunteers of America

Because adults and children often share a common need to achieve technology literacy, strategies with a strong home-school component hold a special promise.
L.G. Thomas and D.G. Knezek, 1995

In 1994 Literacy Volunteers of America (LVA) embarked on a long-term initiative supported by the GTE Foundation to integrate the use of technology into family literacy programs. Over the past five years, fifty GTE Family Learning Centers in seventeen states have been developed with three primary goals:

- Increasing the literacy skills, computer skills, and parenting skills of parents.
- Increasing the pre-literacy, reading, study skills, and computer skills of children.
- Increasing parent-child interaction around reading and school.

Several aspects of parent-child interactions have been shown to be associated with children's later literacy success. These include parental reading to and with children, parental concepts of the roles of education and literacy, and literacy modeling and support present in the home environment (Mikulecky, 1996). Higher reading proficiency has also been seen in children who read more at home, have more types of reading materials in their homes, and have opportunities to discuss reading and school work (U. S. Department of Education, NAEP, 1994). Family literacy programs can help to make some of these outcomes possible.

Using technology in family literacy programs gives parents, children, and parents and children together opportunities to be active participants in their own learning processes. It provides them with valuable skills for other aspects of their lives (school, work, accessing information, etc.) and increases self-esteem. It can provide access to computer technology that might not otherwise be available. The use of technology in literacy programs has successfully attracted students to programs and held their interest. Additionally, teachers have been given a valuable tool for adapting instruction to students' specific learning needs (U.S. Office of Technology Assessment, 1993).

GTE Family Learning Centers are accessible to families and involve collaborations with other community-based efforts, or in the case of correctional facilities, interdepartmental collaboration. These centers are located where families congregate or receive other services such as elementary schools, family service centers, parenting programs, social service agencies, Head Start programs, libraries, housing projects, extension programs, transitional housing, or visiting rooms in correctional facilities. Access is key, as the lives of these families are full, transportation is often difficult, and families have multiple needs which must be addressed in an efficient way.

Access to technology is important to these families. They often are the ones who don't have a computer at home but are reluctant to use a computer in a public library. Yet basic computer skills are becoming essential. Children need to enter school with some basic computer skills and they will need to increase those skills as they move through public school. Parents need computer skills to keep ahead in the workplace and to access information that their families need.

"Using technology in family programs gives parents and children... opportunities to be active participants in their own learning processes."

From the beginning, LVA's GTE Family Learning Centers have seen a wide range of positive outcomes for both parents and children. Parents have applied their newly learned skills to many family issues and activities. They report spending more time reading to their children, and they have increased the number of books and other reading materials in their homes. They have become more involved in their children's education by helping with homework and talking about books, reading, and computers at home. They attend parent/teacher conferences more regularly or volunteer in their children's schools.

Many parents have learned about the software that their children use in school and have used the software with their children to compose or illustrate stories, make cards or a family calendar, or develop a family budget. Parents have become more active in their communities by composing and submitting writing to be published in a newsletter or participating with their family in community literacy activities such as story hours and museum visits.

Parents have also attained employability skills which, in some cases, have led to improved employment or economic status. They have improved their ability to read and understand work-related information including signs, manuals, and forms. They have enhanced their computer skills by using a variety of software to produce resumes, learn word processing, or use e-mail. They have also increased their keyboarding speed and accuracy. Many have met personal goals such as passing the GED, enrolling in other continuing educational or vocational training programs, or obtaining a license or certification.

Parents have applied their skills in the community by using the library or other services to find information, including searching the World Wide Web. They also report involving their family in civic and community activities, registering to vote and voting, and receiving U.S. citizenship or legal immigrant status.

Children, too, have benefited from their involvement in GTE Family Learning Centers by increasing the time they spend with their families on pre-reading, reading, and school related activities and conversations. They have learned to work cooperatively with

others, both parents and peers. They have a greater awareness of the integral part that computers play in their lives today, and have learned patience and care in working with computers.

Programmatically, GTE Family Learning Centers have creatively implemented a wide range of instructional activities and family activities. They provide direct instruction to parents through one-to-one tutoring, small group instruction, computer assisted instruction using educational software and Internet activities, and parenting workshops. A collaborator such as Head Start may provide direct instruction for the children, or the LVA affiliate may provide it through computer assisted instruction, small group reading, or pre-reading activities. These activities might involve puppets, storytelling, crafts, and cooking; or for school-aged children, homework assistance.

"With increased literacy and computer skills, both parents and their children will be better prepared for the future."

PACT (parent and child together) activities at GTE Family Leaning Centers include working together on the computer, reading together, and other small group reading or pre-reading activities. Family events range from family nights, with dinner and activities provided, to educational field trips to museums or plays, sports activities, or holiday activities. Incentives have also proven to be worthwhile and have included book giveaways for a certain level of participation or completion, and family meals provided before or after instruction.

The vision of family literacy programs – parents and their children working and learning together – is one which connects the literacy of an adult with the literacy of a child. It is about role modeling and about interacting with reading materials and information as a starting place to create new family patterns. At the same time, the need for families in our nation to become skilled at using new technologies is critical. For parents with low literacy skills, and for high-risk children, opportunities are often limited; but without those skills, their futures are at risk. Integrating the use of technology into family literacy programs is one step towards addressing this issue. With increased literacy and computer skills, both parents and their children will be better prepared for the future.

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What We've Learned in the GTE Family Literacy & Technology Project

Nancy Frazier
York County Literacy Council
York, Pennsylvania

A few years ago, the idea of family members using computer technology to build and improve literacy as a family unit was novel and exciting. At recent LVA/ GTE Family Literacy Institutes, the idea proved to be thriving. Though no longer a novel idea, it was obvious from the many ideas shared during the Institutes that enthusiasm and support for such programs is alive and flourishing. The following is a summary of what family literacy providers offering technology in their programs have learned.

It's okay for adults to use software designed for kids.

This was an area discussed frequently at the Institutes. The consensus was that it's okay for adults to use software designed for children. Many adult learners when questioned about using children's software have made the statement, "I don't care, it's going to teach me, isn't it?" When children's software is introduced to the child *and* adult as a team, the idea that the software is childish is immediately dispelled.

Adults, especially first time computer users, can be encouraged to work on children's software so that they can become familiar with what their children are doing. This strategy can also help dispel the fear experienced by most first time computer users that they can "break" the machine. Because many adults who are young parents have experience playing arcade type games at home, the comments often heard are, "Hey, this is like the Nintendo game I had. No problem!"

Use interactive software.

Interactive software offers the user the opportunity to record responses, choose difficulty level, and chart progress. Additionally, many adult learners in family literacy programs are low level readers, so the bright graphics in the interactive children's software can help soften the chore of reading and build confidence. This new found confidence is often demonstrated by adult learners as they begin experimenting with more complex software or request to use a word processing program.

Unfortunately, many family literacy programs began with donated or refurbished computers and some groups still use this older hardware. Appropriate and interactive educational software for these "pre-CD-ROM" computers is hard to find. However, older computers can still work well with word processing and writing activities.

Modify mouse pads and keyboards.

Small children and some adults with poor fine motor skills often have difficulty controlling the mouse on a conventional mouse pad. Use a plastic placemat for first time mouse users. The larger surface allows for better control and builds confidence.

Large key keyboards for small fingers are available at reasonable prices. Adults who are first time keyboard users will also appreciate the larger keys. If someone is working on number skills and the keyboard does not have a number pad, fashion a cardboard cover for the letter keys. It is also a good tool to use for the person who is easily distracted or confused by the variety of symbols.

Many software programs that are designed to teach letter recognition request the user to use the keyboard to type the letter being taught. For the individual who has difficulty with certain letters, using a standard keyboard can be confusing. All keyboards display the alphabet in upper case. Though it is good to build the relationship between lower and upper case letters, some learners have difficulty making that connection and become frustrated. To alleviate frustration, cover the key(s) with a small piece of paper or a sticker. Write the appropriate lower case letter on the sticker. Keep the key(s) covered as long as the learner feels it is necessary.

Use headphones instead of speakers.

Headphones shut out noises and help with concentration. They also reinforce the auditory component of learning.

Encourage parents and children to use the Internet.

To take the mystery out of the Internet, encourage children and parents to e-mail pen pals or each other. Set up e-mail accounts for each family member. Help children use the Internet to research information for school reports. Allow families to locate their homes on a Web site like Mapquest <http://www.mapquest.com>, which provides detailed maps to specific locations.

Use Volunteers.

Volunteers can play a vital role in helping parents and children become comfortable with computers. However, not all computer literate, well-meaning individuals are cut out to be tutors who can work in a family literacy technology program. Select qualified volunteers to become the technology tutor trainers– those who will help other tutors learn to work with adults, children, computers, educational software, and the Internet. ■

How Do Computers Enhance Student Achievement?

Excerpt from *The Leader's Guide to Education Technology*

By Empowering Students

The new technology allows students to feel the pride of accomplishment when they view their output, be it a neatly formatted report, a colorful chart, or a desktop-published newsletter. Students become active producers of knowledge, whether they are sharing their findings with the world via a Web page or with their classmates via a PowerPoint™ presentation. And the computer's forgiving nature, which allows even the worst errors to be easily remedied, does wonders for sensitive egos.

By Fostering the Development of Higher-Order Thinking Skills

Used for inquiry-based learning, new technologies allow students to develop the very same competencies identified as essential for the modern workplace. They learn to find and organize complex information, recognize trends and patterns, draw inferences, collaborate on a final product, and more. Research studies note that computer-using students demonstrate greater problem-solving and critical-thinking skills compared to students in traditional classrooms.

By Ensuring Student Mastery

Because instructional software is an infinitely patient, nonjudgmental, one-on-one teacher, it allows each student to proceed through a topic at his/her own pace and repeat whenever necessary until mastery is achieved. And where whole-class tutorials are necessary, today's sophisticated Integrated Learning Systems can track each student's progress, prescribing lessons appropriate to ability levels.

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Computer Technology and the Changing Perception of Literacy

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The skills needed to function and acquire knowledge in a society constantly change to meet historical and cultural demands. To be literate today means something quite different from what it meant a century or even a decade ago. What it means to be literate also varies from one society to another. In the United States, as in other industrialized nations, the way we think about literacy is being transformed as computers become an integral part of daily life for many of us. Computer literacy is rapidly becoming an indicator of an individual's ability to function in society.

As a team of graduate students in the field of communications, we wanted to investigate how computer technology is shaping attitudes towards literacy in this society. We also wanted to explore the relationship between computer technology and the process of becoming literate. Our objective was to gather and then analyze testimonies and insights from people engaged in diverse educational and training activities, computer and non-computer related. In face-to-face interviews we posed the following questions: "How is computer technology shaping the meaning and perception of literacy?" and "Are computers supporting, enhancing, or replacing practices traditionally associated with literacy learning?"

Definition of Terms

There is no universal definition of literacy. We selected the one proposed in the 1991 National Literacy Act because it most closely matched the ideas of those we interviewed and our own. According to the NLA, "Literacy is an individual's ability to read, write, and speak in English, and compute and solve problems at levels of proficiency necessary to function on the job and in society, to achieve one's goals, and develop one's knowledge and potential." (NIFL, 1998, p. 3)

Early in our study, it became apparent that those we interviewed saw literacy as a continuum, with individuals with low literacy skills placed at one end of the continuum, and individuals with highly developed literacy skills placed at the other. We decided to adopt the terms "functional literacy" and "critical literacy" to reflect these gradations.

Functional Literacy: Functional literacy refers to the practical, day-to-day dimension of literacy, the minimum skills necessary for an individual to function in society (e.g., recognize a stop sign, distinguish between a five and twenty dollar bill, etc.).

Critical Literacy: On the other side of the continuum is critical literacy, the skills necessary to develop one's knowledge and potential. This is the liberatory or empowering dimension of literacy, which includes the ability to process and arrange information into new understandings and use these understandings to engage and transform one's world, not just function in it.

Apart from these dimensions of literacy, we found it necessary to distinguish between two modes of achieving literacy relevant to this study: "traditional literacy" and "computer literacy."

Traditional Literacy: Traditional literacy involves acquiring the basic skills needed to read and write. It relies primarily on traditional methods and materials such as print media and oral instruction.

Computer Literacy: The focus of computer literacy is acquiring the skills needed to operate computers and access information with them. It involves the process of using computer technology to acquire knowledge.

Research Design

Although we found no other studies that address how computers are changing our ideas and assumptions about literacy, we did encounter a variety of material that dealt with computers in educational settings. The following is a description of a representative study in each of three areas intended as a quick survey of contemporary attitudes.

"Computer literacy is rapidly becoming an indicator of an individual's ability to function in society"

Cognition: In a study of the educational implications of the computer, Barnes and Strate (1996) describe the way in which digital media is altering the way knowledge is constructed. Learning in the random-access environment of the computer, where the learner is encouraged to follow ideas in a nonlinear fashion, is quite different from traditional, structured learning experiences. The authors consider the cultural, social, and psychological implications of this shift and call for a more critical integration of computers into classrooms.

Comparison with Traditional Media: *The Report to the President on the Use of Technology to Strengthen K-12 Education in the United States* (1997) compares numerous quantitative studies and concludes that students using computer-based instruction significantly outperform their peers.

Technology and Knowledge: Woodward (1993) proposes looking at communication technologies, including the computer, not as instruments of choice and access, but as instruments of self-knowledge that should be distributed according to principles of social justice. He suggests that technology can be used to promote not just practical knowledge, but liberatory knowledge as well.

For our study, we chose a descriptive qualitative method consisting of open-ended interviews to explore how computer technology is shaping educators' attitudes towards literacy. Participants were chosen purposively and selectively, but without prior knowledge of their opinions. The basic criterion for selection was involvement in an educational or training activity. The six participants included:

- A vocational school teacher who provides instruction on software applications, programming languages, and hardware systems design.
- A librarian who facilitates group and individual computer hardware and software training for staff and health care professionals at a hospital.
- The founder and director of a non-profit organization that provides free computer literacy classes that are open to the community.
- A teacher with experience in art and humanistic education who uses computers infrequently, but has been involved with the introduction, training, and use of computers in the educational process.
- A director of a computer center at a vocational school.
- The associate executive director of a non-profit literacy organization.

An initial set of questions was designed to motivate the educators to share their opinions and experiences with us. Apart from the questions, they were asked to briefly describe their jobs and the organizations they worked for.

We expected to find a gap between those who used computers extensively in their teaching and those who preferred traditional literacy methods. Instead, we found that every one of our participants utilized computers in one way or another.

After the first round of interviews, patterns, themes, and trends began to emerge. Discussion led to a tentative interpretation and a second round of interviews. The purpose was to clarify and expand the concepts that had emerged in the first round.

Findings

Our findings can be described in the context of two metaphors which reoccured frequently in the interviews.

The Computer as Enchancement: Each of the participants had a slightly different opinion about how computer technology is redefining what it means to be literate in this society. However, we found that all the participants saw similar relationships between traditional and computer literacy, and between functional and critical literacy.

We believe that all of the educators we interviewed see computer literacy as expanding and/or enhancing traditional literacy. We found that they see computers as catalysts in the process of gaining skills, information, and knowledge; however, they recognize that the computer can impede or enhance the process towards critical literacy, depending on how it is used. They have very realistic views about the need to elevate computer literacy from a functional to a critical dimension.

Although they recognize the importance of computers, the participants did not view computers as appropriate for every educational need. They were consistently in the center concerning the role of computers in the learning process, and they were cautious of uncritical implementations of computers in learning environments.

The Computer as Tool: Each one of the educators expressed the view that the computer is indeed changing the way literacy is understood in our society. The metaphor of "computer as tool" may help us understand how these changes are taking place. In the interviews, the computer was often referred to as a "tool," perhaps even a "good tool," for learning or gathering information, but it was not seen as essential to the learning process. This was surprising to us because it seems to contradict the highly publicized national technology initiative and the politically charged atmosphere regarding the use and implementation of computers in the U.S. educational system. These educators seemed to believe that it will take more than a "wired" classroom to meet the literacy needs of the nation, although they saw the eventual integration of basic computer skills into the definition of functional literacy.

Furthermore, the relationship between the functional and critical dimensions of literacy and the image of computers as tools was frequently emphasized. The computer can be used as a passive tool, a glorified slide show in which lessons can be drilled; or an active tool which invites interaction, discovery, and critical thinking. The responsibility to use the tool effectively lies both with the designer and the user.

Conclusion

Through this study we hope to contribute to an understanding of the role that computer technology plays in today's educational and learning systems. We recognize the limitations of our efforts, and would like to consider our conclusions as tentative rather than final statements.

We found in our interviews that using the computer as a learning tool can enhance literacy learning. However, according to the participants, literacy is not just about reading and writing, it is also about having a set of critical skills that make it possible to use knowledge to understand and transform the world.

This group of educators seemed to believe that critical skills and literacy should be merged, but that computers are only one of many options available to achieve this integration, albeit an increasingly popular option. Computers can stimulate learners to think, but they are not the only way to encourage critical thinking.

In addition, the interviews contain references that acknowledge the potential of computers to help learners who might not profit from traditional educational methods. Those with

learning disabilities and special learning needs may benefit from the computer's ability to be tailored to specific needs.

From the results of this study, we speculate that there is a strong social context that underpins the alliance between educators and computer technology. Equal access to computer technology in educational and training settings was seen as important, even essential, for all learners. We would like to argue that equal access is not the concern of activists and legislators only, but it is also the concern of literacy practitioners, educators, and learners. Likewise, the actual design of the systems by which computers can become tools for self-knowledge is not the concern of big hardware manufacturers and software developers alone. If computers are to be transformed into tools of critical thinking, literacy practitioners will have to become deeply involved in issues of distribution and appropriate design.

From our findings, we conclude that much more research is needed to explore how computer technology is redefining the process of becoming literate in our society. Further debate and research are also needed to examine how computers can promote critical literacy, and how equal access to resources can be guaranteed. ■

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How Can Technology Remove Barriers to Learning?

Excerpt from *The Leader's Guide to Education Technology*

By Removing the Barrier of Geography

Thanks to the Internet, students everywhere now have access to the world. A student surrounded by the brick canyons of inner-city Chicago or by the sandstone canyons of New Mexico can view the American Memory materials at the Library of Congress Web site as easily as she or he can view interactive science exhibits at San Francisco's Exploratorium Web site. Distance learning, brought to the classroom via the Internet, satellite video, fiber optic, or even cable, also allows students to complete college courses, get AP credits, take classes where no certified teacher is available locally, or even complete a high school degree at home.

By Removing the Barrier of Economic Status

When financial constraints mean that the library has no budget for purchases, it is difficult to understand the joys of research. But a networked classroom computer can access the Internet and bring a library and more to the classroom, even allowing students to download the texts of books that their library does not own. While it is not without a cost of its own, technology permits more students to gain access to resources, more efficiently, than traditional means.

By Removing the Barrier of Individual Learning Styles

Not everyone learns in the same way, and even though it is important to be able to process written information from the printed page, sometimes visual images provide the missing clues. For some students the interactivity of the computer and the use of a mouse to "touch" the materials will improve learning. For other students repetition is necessary to get the big ideas, and CD-ROMs and videodisks not only allow learners to view a film clip of a heart muscle contracting but allow them to see it over and over till the message sinks home. The ability to organize information in different ways will capture the attention of some students, while others will benefit from seeing the power and beauty of mathematical formulae graphed on the screen and redrawn as the variables change, just as they do on a spreadsheet. Both research studies and teachers' reactions note the value of technology for meeting the learning needs of all students.

By Minimizing the Barrier of Special Needs

Adaptive technologies lessen physical challenges and enable everyday tasks. The speech impaired can "talk" as voice-synthesizing software converts their typed words into speech and conversely those who cannot type can speak their words as speech-to-text translation software places them on the screen. The hearing impaired need only see the screen to learn; there are Braille keyboards and printers for the visually impaired; and many more adaptive devices exist and can be acquired for the range of physical limitations present in schools. Moreover, with the infinite patience of the computer, learning impaired students are able to repeat problems until they master them.

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Using Technologies Effectively in Adult and Vocational Education

Susan Imel
1999

Technology is not a means to an end. We must know how to use this technology and use it to better meet the needs of our learners.
Noreen Lopez, PBS LiteracyLink *(Rosen, 1999)*

The current emphasis on the educational applications of technology differentiates this wave of technological innovation from those of the past (Merriam & Brockett, 1997). Technology as both an educational delivery method and instructional tool is being discussed widely in adult and vocational education. However, it is often introduced without much thought, and it changes rapidly. This article presents information about educational applications of technology and provides some guidelines for its use in adult and vocational education.

The Case for Technology

Technology permeates our society. Recent news stories about the Y2K problem, for example, provide evidence of the dependency of modern life on computer technology. Website addresses now appear regularly in the media with the assumption that they will be consulted for further information. In work settings, employees are expected to use computers for such tasks as communication, information management, problem-solving, and information seeking. Because technology is such an integral part of modern life, it behooves educators to prepare learners to use it effectively.

"The ability to support new ways of teaching and learning is one of the most frequently cited reasons for using technology in education."

However, technology also has a role in the instructional process for it can serve as a means of supporting and enhancing instruction. Based on an analysis of the literature, Hopey (1998) noted that educational technology can:

- Improve educational attainment and skill acquisition
- Reduce the educational disparities created by race, income, and region
- Improve the relationship between learning, assessment, and effectiveness
- Provide a relevant context for learning
- Accommodate differences in learning
- Motivate and sustain learning
- Provide greater access to learning opportunities
- Empower learners

The positive effects attributed to technology will occur only if it is used appropriately. Like any other instructional tool, technology can serve to perpetuate poor educational practice or it can become a means for transforming learning. How technology can enhance and support learning is discussed in the next section.

Considerations for Using Technology

Technology does not determine learning outcomes, and it does not teach students; teachers, frequently in collaboration with learners, make the choices that determine learning outcomes and manage the teaching and learning process (Burge & Roberts, 1993; Ehrmann, 1997; Whitesel, 1998). The role of technology is to expand these choices (Ehrmann, 1998). Technologies are not neutral tools, however. The choices made about which technologies to use as well as how to use them will "reflect whatever values the educator holds—consciously or subconsciously—about her/his relationships with learners, and their use will invariably bring advantages and disadvantages" (Burge & Roberts 1993, p. 35).

When educational technologies are used appropriately, their advantages far outweigh their disadvantages. The ability to support new ways of teaching and learning is one of the most frequently cited reasons for using technology in education. For example, it provides opportunities for more learner-centered instruction; it permits instruction to be contextualized; it allows students to explore, make mistakes, and learn from their errors; it leads to more active and interactive modes of instruction; and it results naturally in greater collaboration, cooperation, and small group work (Gillespie, 1998; Kearsley & Shneiderman, 1998; Petraglia, 1998).

These characteristics of teaching and learning should be particularly attractive to adult and vocational educators for they are frequently associated with good educational practice in those fields. The key is using the technologies in ways that will enhance learning. Technology cannot simply be an add-on but "must be matched by new imagination" (Koehler, 1998, p. 36), new mental models (Dickson & Segars, 1999), and infusion into the instructional process (Sulla, 1999). It must be accorded a presence in the classroom in its own right and used in ways that maximize the different strengths that is has to offer (Koehler, 1998).

Guidelines for Using Technology in Adult and Vocational Education

Some guidelines for using technology in adult and vocational education to achieve the outcomes described in the previous section follow:

- **Let learning outcomes drive the process of technology choice**. It is easy to get caught up in all the hype associated with technology and to want to be part of the group that is using the latest technological innovation.

"Technology should not wag the dog," however (Gandalfo, 1998, p. 36). Technology is only a tool and decisions to use any technology must be made as a part of an overall instructional plan. Questions to consider include What am I trying to accomplish? and Will technology help me achieve that goal?

- **Strive to infuse and/or integrate technology into the instruction**. Technology should be integral to the teaching and learning process. In most settings, it should be invisible and transparent. Ginsburg (1998) presents a helpful way to think about integrating technology into adult learning that is also applicable to vocational education by proposing four basic approaches: technology as curriculum, delivery mechanism, compliment to instruction, and instructional tool. Each approach has its benefits and limitations but the latter—technology as instructional tool—is superior to the other approaches. In this approach, the primary instructional goals remain the same with technology being used to enrich and extend them. The approach moves technology beyond being seen as an end in itself to being a tool that is integral to learning (Sulla, 1999). Because some adult and vocational education programs provide instruction about the technology itself and the skills to use it, however, technology as curriculum may be the most appropriate approach in some settings.

"Technology enables the instructor to become a facilitator of learning as well as a planner, guide and mentor."

- **Use technology to shift the emphasis in teaching and learning**. Traditionally, the emphasis in teaching and learning has been on the instructor as both the subject-matter expert and as the primary deliver of instruction. Theories of learning that undergird much of adult and vocational education call for a different emphasis, one that is more learner centered and that depends on contextualized learning opportunities. Under the more traditional teaching-learning paradigm, such goals have not always been easily achieved. The emergence of some of the new technologies, particularly the Internet and the World Wide Web, supports the use of these more collaborative, contextualized approaches. Technology can enable learners to take a more active role in the learning process, to use a greater variety of learning styles, to have access to a wider range of resources, and to engage in collaborative learning through increased interaction with other students (Gillespie, 1998).

- **Be prepared to modify the role of the instructor**. When the emphasis in teaching and learning shifts to be more learner centered, the role of the instructor changes. Technology can assume some of the tasks formerly performed by the teacher, freeing the teacher to facilitate the process of discovery for the students. Technology enables the instructor to become a facilitator of learning as well as a planner, guide, and mentor. Also, when technology is used to provide access to information and knowledge outside the classroom, the teacher no longer has the primary role of subject matter expert (Gillespie, 1998; Koehler, 1998; Whitesel, 1998). For those adult learners who prefer a less directive style of instruction and a less hierarchical relationship, this change is particularly welcome (Whitesel, 1998).

- **Use technology to move the focus away from low-level cognitive tasks to higher-order thinking skills**. The traditional model of systematic instructional design "requires the specification of precise levels of content and learning objectives and is based on the teacher as content expert and controller of student learning" (Gillespie, 1998, p. 47). New technologies, however, can be used to move away from a focus on these low-level cognitive tasks to the development of higher-order thinking skills. To develop synthesis and integration skills, for example, students can be given the assignment of using the Internet to find material that represents a variety of perspectives and then asked to develop an interpretation of it (ibid.). To move to this level, instructors need to ask several questions including What skills do I want the learner to address? and How can technology be used to support the development of these skills (ibid.)?

Conclusion

Used appropriately, technology can support many of the goals of adult and vocational education. The path to wise use begins by asking What do I want to accomplish? and then considering how technology can play a role in achieving those goals.

This article was first published as an ERIC Practice Application Brief. It may be freely reproduced and is available at <http://ericacve.org/fulltext.asp>. ■

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NIFL/*LINCS* Electronic Discussion Groups

Established in 1995, the National Institute for Literacy online discussion lists give thousands of literacy stakeholders opportunities to discuss the literacy field's critical issues; share resources, experiences, and ideas; ask questions of subject experts; and keep up-to-date on literacy issues. Each national *LINCS* discussion list is moderated by a national organization with expertise in the topic area. The current *LINCS*-sponsored lists include:

- Adult Numeracy
- Equipped for the Future
- English as a Second Language
- Family Literacy
- Focus on Basics
- Health and Literacy
- Homelessness and Literacy
- Learning Disabilities
- National Literacy Advocacy
- Technology
- Women in Literacy
- Workplace Literacy

For a description of each list:

1. Go to <http://www.nifl.gov/lincs/discussions/discussions.html>.
2. Next to the link of your choice, click on "Description."

To subscribe:

1. Go to <http://www.nifl.gov/forums.html>.
2. Clink on "Subscribe to Listservs."

To browse list messages:

1. Go to <http://www.nifl.gov/forums.html>.
2. Click on the list to browse.
3. Select archive year to browse.

To search list messages:

1. Go to <http://www.nifl.gov/forums.html>.
2. Click on "Search Listservs."

From the Editor's Desk

Uses for technology in adult literacy and lifelong learning continue to grow at an amazing rate. The following descriptions highlight just a few useful resources in several categories. Please note that all of the Internet addresses (URLs) listed were active as of December 1999.

Resources for Staff Development

Whether you are comfortable navigating the World Wide Web, or are just beginning to explore its possibilities for yourself and your students, the Internet offers many learning opportunities for practitioners.

An on-line course, *Teaching and Learning with Internet-based Resources, A Set of Lesson Plans and Activities* <http://novel.nifl.gov/susanc/inthome.htm>, was created by Susan Cowles as part of a 1996-97 National Institute for Literacy (NIFL) Literacy Leader Fellowship. The goal is to help teachers and learners increase their skills while exploring the Internet.

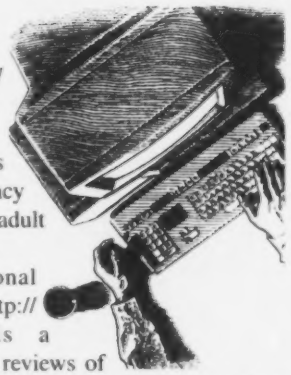
A print copy of the publication, *Teaching and Learning with Internet-based Resources* is available from the U.S. Department of Education (toll-free: 1-877-433-7827 or fax 301-470-1244). Also available in print is the publication, *Using The Internet As An Instructional Tool* from The New York State Education Department, Office of Elementary, Middle, Secondary, and Continuing Education in Albany, New York. For a copy contact the Publications Sales Desk, Room 309, Education Building, Albany, New York 12234, (518) 474-5915. A copy can also be downloaded from the National Adult Literacy Database at <http://www.nald.ca/fulltext/hudson/internet/cover.htm> A list of other online tutorials for using Internet-based resources in the classroom is available from NIFL<http://novel.nifl.gov/tutor.htm>.

The National Center on Adult Literacy (NCAL) is developing a technology-based training program for adult literacy educators called LITKIT. Comprised of a series of multimedia CD-ROM's, LITKIT will provide a professional training program for adult literacy educators using a technology based format that is effective and accessible. Information about this new initiative can be found at <http://litserver.literacy.upenn.edu/pr/litkit.html>.

LiteracyLink, a partnership of the Public Broadcasting Service, NCAL, KET/The Kentucky Network, and the Kentucky Department of Education, is a multimedia instructional service designed to increase access to learning opportunities for adult learners and expand professional development opportunities for adult literacy providers. LitTeacher: Services and Resources for Teachers <http://litlink5.pbs.org/litteacher/index.html> currently offers four certificate programs. For a list of online courses, costs, and information on how to use LitTeacher take the Welcome Tour at <http://litlink5.pbs.org/litteacher/welcome_tour/>.

Resources for Educational Software

Computers and software are becoming essential components of many curriculum plans. As the variety of educational products rapidly increase, teachers need help selecting appropriate materials. The following sites offer assistance in evaluating and selecting software.



The Literacy List <http://www2.wgbh.org/MBCWEIS/LTC/ALRI/software.html> maintained by David Rosen offers several useful lists for adult literacy practitioners including a list of adult education software review sites.

The California Instructional Technology Clearinghouse <http://clearinghouse.k12.ca.us> is a searchable database that offers reviews of over 2,000 programs including computer software, CD-ROMs, computer-interactive videodiscs, and instructional videos. The Clearinghouse has rated all of the items in the database.

The Northwest Educational Technology Consortium (a division of the Northwest Regional Educational Laboratory - NWREL) <http://www.netc.org/software/review_sources.html> a research and development organization supported by the U.S. Education Department and the Office of Educational Research and Improvement offers a list of software review sources. A list of other ERIC Digests related to educational technology can be found on the ERIC Clearinghouse on Information and Technology (ERIC-IT) Web site <http://www.askeric.org/ithome/>.

A review of software by the GTE Family Literacy and Technology Initiative <http://www.literacyvolunteers.org/affiliates/index.htm> can be found on the LVA website in the "Affiliates Only" section. Look for "GTE Family Literacy Information."

For a list of software vendors, as well as other useful information for adult educators, visit The Outreach and Technical Assistance Network (OTAN) <http://www.otan.dni.us/>. You must register for a user ID on-line in order to access this site.

Educational Resources <http://www.edresources.com> and the Educational Software Institute <http://www.edsoft.com> offer reviews, resource guides, and comprehensive on-line catalogs on their Web sites.

Resources for Technology Planning

As technology becomes more and more integral to life-long learning, a thoughtful technology plan for the future is essential. The following sites provide access to technology plans from around the country as well as ideas about the planning process.

The National Center on Adult Literacy (NCAL) offers a list of on-line resources, Educational Technology Resources for Adult Literacy <http://ncal.literacy.upenn.edu/ncal/edresadultlit.html>, which includes many topics related to educational technology including technology planning.

Also available from NCAL are full, on-line publications on technology planning such as, "Technology, Basic Skills, and Adult Education: Getting Ready and Moving Forward," edited by Christopher Hopey. For a list of available documents go to the "Hot Topics" page on the NCAL website <http://ncal.literacy.upenn.edu/tech/index.html>.

The Northwest Educational Technology Consortium <http://www.netc.org/tech_plans/index.html> also provides sample technology plans and research on the planning process. Similar resources are available from The SouthEast & Islands Regional Technology in Education Consortium (SEIR-TEC) <http://www.serve.org/seir-tec/techplan.html>.

For additional Internet resources on technology planning, you may want to review the list of links provided by the Texas Center for Educational Technology <http://www.tcet.unt.edu/tek-plan.htm>.

If you are especially interested in issues of equitable access to technology you can find a compilation of resources prepared for the Community Technology Centers' Network (CTNET) <http://ctcnet.org/csk.html>.

Resources on Innovative Projects and Exemplary Programs

In 1995 the Durham County Literacy Council in Durham, North Carolina developed an innovative approach to combining computers and books in a family literacy program. The result was Parents' Part, a series of 16 workshops aimed at teaching parents job-related computer skills, exposing children to motivating pre-reading experiences, and helping parents recognize and strengthen their role as their children's first and most influential teachers.

Recently, in response to welfare reform, the Durham County Literacy Council piloted an ambitious family literacy collaboration drawing on the resources of a community college, a historically black university, and their own adult literacy volunteers. They have also begun to use the National Institute for Literacy's "Equipped for the Future Role Maps" to guide their curriculum and assessment processes. Program planners believe that this family literacy project has great potential for replication, and are currently mentoring programs in Maryland and Virginia through Laubach's UPS Family Learning Project. For more information, contact Lucy Haagen (durhamlit@mindspring.com).

The mission of the Center for Applied Special Technology (CAST) in Peabody, Massachusetts is to expand opportunities for individuals with disabilities through innovative uses of computer technology. The Center established the Family and Community Literacy Project to address the issue of disability as a barrier to literacy and the effective use of technology. Over the past four years, the project has been highly successful in providing a computer-based learning environment in which parents with low-literacy skills enjoy success for themselves and for their children. Five national sites have developed local training programs to address the literacy needs of families in their communities. For more information see CAST's Web site <http://www.cast.org>. ■

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